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HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

EXAMINER	
LIU, LI	
ART UNIT	**PAPER NUMBER**
2613	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/25/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/603,071	WALTHER ET AL.	
	Examiner	Art Unit	
	Li Liu	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,11,26,27,29-36,39,54-83 and 85-118* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *87-97 and 103-113* is/are allowed.

6)☐ Claim(s) *1-8,11,26,27,29-36,39,54-67,79-83,85,86,98-102 and 114-118* is/are rejected.

7)☐ Claim(s) *68-78* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 February 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment to the claims filed on 02/05/2007 has errors.

1). Page 3, line 2, "Please cancel Claims 9, 10, 12-25, 28, 37, 38, 40-53, 58-64, 67, 82-84" should be changed to "Please cancel Claims 9, 10, 12-25, 28, 37, 38, 40-53 and 84".

2). Page 26, line 3 under REMARKS, "Applicants are canceling claims 9, 10, 12-25, 28, 37, 38, 40-53, 58-64, 67, 82-84" should be changed to "Applicants are canceling claims 9, 10, 12-25, 28, 37, 38, 40-53 and 84".

The errors have been confirmed in a telephone interview with James M. Smith on April 19, 2007. Authorization for changing the amendment was given in the telephone interview.

Response to Arguments

2. Applicant's arguments with respect to claims 1-8, 11, 26, 27, 29-36, 39, 54, 55, 57-64, 67, 82 and 83 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. The amended claim 62 is objected to because of the following informalities: claim 62, line 1, "A device of claim 6" should be changed to "A device of claim 61". Appropriate correction is required.

4. The claim 84 in the amended claims should be labeled as "(canceled)" and the text should be removed.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 85, 86, 98-100 and 114-116 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 85, 98, 101 and 114 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: the polarization beam splitter and the polarization rotational devices.

The claims 85, 98, 101 and 114 recite the limitations: an aperture; a first stack of deflectors deflecting respective electromagnetic signals passing through the aperture structure; and a second stack of deflectors deflecting respective electromagnetic signals passing through the aperture structure. But it is not clear how the two stacks of deflectors deflect the same signal passing through the same aperture structure. In the original disclosure and the drawings (Figures 6 and 12), the aperture and two stacks of deflectors are coupled by the polarization beam splitter (PBS) and two polarization rotational devices (QWP or FR in Figure 6, or HWR and FR in Figure 12). And the polarization splitter splits the signal into two parts so that the each stack of deflector can

deflect part of the signal; and the PBS is positioned "so that it is transparent to signals on 103 polarized along one direction, so that these signals travel along 104" (to the first stack of deflectors), and "reflects the signals with perpendicular polarization so that they travel along 105" (to the second stack of deflectors); and the polarization rotational devices QWP and FR are positioned "so that a signal for which the PBS 21 was transparent ends up being reflected on PBS, and vice versa" (page 9, line 12 to page 10 line 9; and page 15 line 6-15). The polarization beam splitter and the polarization rotational devices is essential to the stacks of reflectors and the aperture.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 3, 27, 29, 31, 55, 57, 59, 83, 117 and 118 are rejected under 35 U.S.C. 102(e) as being anticipated by Moon et al (US 2002/0176151).

1). With regard to claim 1, Moon et al discloses a communication device (Figure 1) comprising:

an aperture structure (24 and 26 in Figure 1); and

wavelength dependent deflectors (the deflectors on the spatial light modulator 36, as shown in greater detail in Figures 2 and 3) deflecting respective electromagnetic signals of respective wavelengths (Figure 2 and 3, each deflector reflects respective different wavelength) at different respective wavelength dependent angles (the angle of the deflector is dynamically controlled by a controller 58, Figures 2 and 3) to dynamically and independently steer (controlled by a controller, page 5, [0109]) the electromagnetic signals passing through the aperture structure to and from remote devices (the signal to and from the circulator 16 in Figure 1).

2). With regard to claim 3, Moon et al discloses wherein at least one of the deflectors is movable (Figure 3, the deflector can be tilted, page 3, [0109]).

3). With regard to claim 27, Moon et al discloses wherein the aperture structure is a telescope (the capillary tube 24 and collimator 26 forms a telescope structure, Figure 1).

4). With regard to claim 29, Moon et al discloses method for communication comprising:

passing electromagnetic signals through an aperture structure (24 and 26 in Figure 1); and

deflecting respective electromagnetic signals of respective wavelengths at different respective angles (Figure 2 and 3, each deflector reflects respective different wavelength), by wavelength dependent deflectors the deflectors on the spatial light modulator 36, as shown in greater detail in Figures 2 and 3) to dynamically and independently steer the electromagnetic signals (controlled by a controller, page 5,

[0109]) passing through the aperture structure to and from remote devices (the signal to and from the circulator 16 in Figure 1).

5). With regard to claim 31, Moon et al discloses wherein at least one of the deflectors is movable (Figure 3, the deflector can be tilted, page 3, [0109]).

6). With regard to claim 55, Moon et al discloses wherein the aperture structure is a telescope (the capillary tube 24 and collimator 26 forms a telescope structure, Figure 1).

7). With regard to claim 57, Moon et al discloses a communication device (Figure 1) comprising:

aperture means (24 and 26 in Figure 1); and

means (the deflectors on the spatial light modulator 36, as shown in greater detail in Figures 2 and 3) for wavelength dependent deflecting of respective wavelength division multiplexing electromagnetic signals (Figure 2 and 3, each deflector reflects respective different wavelength) of respective wavelengths at different respective angles (the angle of the deflector is dynamically controlled by a controller 58, Figures 2 and 3) to dynamically and independently steer (controlled by a controller, page 5, [0109]) the electromagnetic signals passing through the aperture means to and from remote devices (the signal to and from the circulator 16 in Figure 1).

8). With regard to claim 59, Moon et al discloses wherein at least one of the means for deflecting is movable (Figure 3, the deflector can be tilted, page 3, [0109]).

9). With regard to claim 83, Moon et al discloses wherein the aperture means is a telescope (the capillary tube 24 and collimator 26 forms a telescope structure, Figure 1).

10). With regard to claim 117 and 118, Moon et al discloses wherein the device or method transmits and/or receives wavelength division multiplexing electromagnetic signals (the signal to aperture 24 and 26 is a wavelength division multiplexed optical signal).

9. Claim 56 is rejected under 35 U.S.C. 102(e) as being anticipated by Riley et al (US 6,763,149).

Reiley et al discloses a method for deflecting electromagnetic waves comprising:

independently deflecting electromagnetic waves within a first wavelength band at a dynamic angle (Figure 29, e.g., the deflector 266 deflects electromagnetic wave within a first wavelength band "Red" at a specific angle) and passing electromagnetic waves within a second wavelength band by a first deflector (the deflector 266 passes electromagnetic waves within a second wavelength band "Yellow" or "Green" or "Blue"); and

independently deflecting electromagnetic waves within a second wavelength band, at a dynamic angle, by a second deflector (Figure 29, the deflector 268 deflects electromagnetic waves within a second wavelength band "Yellow"), the second deflector positioned to receive the electromagnetic waves passed through the first deflector (the deflector 268 receives the electromagnetic waves "Yellow" or "Green" or "Blue" passed through the first deflector).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1, 3-8, 11, 26, 27, 29, 31-36, 39, 54, 55, 57, 59-65, 67, 79, 80, 82, 83, 85, 98, 99, 101, 114, 115, 117 and 118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockewell (US 6,327,063) in view of Sakanaka (US 7,058,307) and Riley et al (US 6,763,149).

1). With regard to claims 1, 29 and 57, Rockewell discloses a device and method for communication (Figure 2) comprising:

an aperture structure (the telescope 64 in Figure 2, for passing electromagnetic signals); and

deflector (the mirror 62 in Figure 2) deflecting respective electromagnetic signals at different angles (Figure 2, the mirror 62 is rotated to fine tune the signal beams, column 7 line 57 to column 8 line 21) to dynamically and independently steer the electromagnetic signals passing through the aperture structure to and from remote devices (the signals λ_T and λ_R is steered to passing through the aperture structure to and from remote devices such as satellite or ground station, Figure 1).

But, Rockewell does not disclose that the deflector is wavelength dependent, and the deflectors deflect respective electromagnetic signals of respective wavelengths at different respective wavelength dependent angles.

However, Sakanaka, in the same field of endeavor, discloses a deflector (the mirror 23 in Figure 1) that can dynamically deflect different signals from different transceivers at different angles (11a, 11b and 11c in Figure 1, column 4, line 31-61). But, Sakanaka teaches one deflector, and the base system 10 in Figure 1 can transmit and receive to and from only one remote device at a time. However, another prior art, Riley et al, discloses a stack of wavelength dependent deflectors (266, 268, 270 and 272 in Figure 29, and 103 in Figure 1B), and the deflectors deflect respective electromagnetic signals of respective wavelengths (e.g., the RED, YELLOW, GREEN and BLUE) at different respective wavelength dependent angles (Figure 29, each deflector has different deflecting angle).

Sakanaka teaches to communicate with different remote devices through deflector, Riley et al teaches a stack of wavelength dependent deflectors, the combination of Sakanaka and Riley et al can make the device of Sakanaka to communicate with multiple device at the same time. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the deflector and wavelength dependent deflecting as taught by Sakanaka and Riley to the system of Rockewell so that the system can transmit and receive to and from multiple remote devices at a time and the system capacity can be substantially increased.

2). With regard to claims 3, 31 and 59, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein at least one of the deflectors is movable (e.g., 62 in Figure 2 of Rockwell, and 24 in Figure 1 of Sakanaka).

3). With regard to claims 4, 32 and 60, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein the deflectors form a first stack, a deflector in the first stack passing a signal deflected by another deflector in the first stack (Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and a deflector, e.g., 270, passes a signal, e.g. "BLUE" deflected by another deflector, e.g., deflector 272).

4). With regard to claims 5, 33 and 61, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4, 29, 32, 57 and 60 above. And Rockwell and Sakanaka and Riley et al further disclose wherein at least one deflector in the first stack deflects substantially all signals within a wavelength band (Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and the deflector 272 deflect all signals within a wavelength band "BLUE").

5). With regard to claims 6, 34 and 62, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4, 5, 29, 32, 33, 57, 60 and 61 above. And Rockwell and Sakanaka and Riley et al further disclose wherein individual deflectors in the first stack deflect substantially all signals each within its respective non-overlapping wavelength band (Figure 29 of Riley et al, e.g., the deflector 266 deflect substantially all signals each within its respective non-overlapping wavelength band "RED", and the deflector 270 deflect substantially all signals each within its respective non-overlapping wavelength band "GREEN") and pass signals deflected by other

deflectors in the first stack (Figure 29 of Riley et al, e.g., the deflector 266 pass signals "YELLOW", GREEN" and "BLUE" deflected by other deflectors in the first stack).

6). With regard to claims 7, 35 and 63, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4-6, 29, 32-34, 57 and 60-62 above. And Rockwell and Sakanaka and Riley et al further disclose wherein at least one of the deflectors in the first stack is movable (e.g., 62 in Figure 2 of Rockwell, and 24 in Figure 1 of Sakanaka).

Although Rockewell and Sakanaka and Riley et al don't specifically disclose to reflect signals at nearly normal incidence, such limitation are merely a matter of design choice and would have been obvious in the system of Rockewell and Sakanaka and Riley et al. Rockewell and Sakanaka and Riley et al teach reflecting different signal at different angles. The limitations in claims 7, 35 and 63 do not define a patentably distinct invention over that in Rockewell and Sakanaka and Riley et al since both the invention as a whole and Rockewell and Sakanaka and Riley et al are directed to wavelength dependent deflectors. The reflecting angles are determined by the positions of the remote device and the transceiver at the base system. Therefore, to reflect signals at nearly normal incidence in Rockewell and Sakanaka and Riley et al would have been a matter of obvious design choice to one of ordinary skill in the art.

7). With regard to claims 8, 36 and 64, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4-6, 29, 32-34, 57 and 60-62 above. And Rockwell and Sakanaka and Riley et al further disclose wherein the

deflectors in the first stack are reflectors (Figure 29 of Riley et al andFigure 2 of Rockwell, the deflectors are reflectors).

8). With regard to claims 11, 39 and 67, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4, 29, 32, 57 and 60 above. And Rockwell and Sakanaka and Riley et al further disclose wherein individual deflectors in the first stack pass signals deflected by other deflectors in the first stack (Figure 29 of Riley et al, e.g., the deflector 266 pass signals "YELLOW", GREEN" and "BLUE" deflected by other deflectors in the first stack).

9). With regard to claims 26, 54 and 82, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein electromagnetic signals deflected by at least one of the deflectors carry communications transmitted by the device and communications received by the device (Figures 1 and 2 of Rockwell, the electromagnetic signals λ_T and λ_R deflected the deflector 62 carry communications transmitted λ_T by the device and communications received λ_R by the device).

10). With regard to claims 27, 55 and 83, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein the aperture structure is a telescope (the telescope 64 in Figure 2 of Rockwell).

11). With regard to claims 65, 79 (in view of the 112 rejection above), Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57 and 60-62 above. And Rockwell and Sakanaka and Riley et al disclose a first stack of

deflectors for deflecting respective electromagnetic signals (e.g., 62 in Figure 2 of Rockwell, and 24 in Figure 1 of Sakanaka) passing through the aperture structure at respective angles, individual means for deflecting in the first stack deflecting substantially all signals each within its respective non-overlapping wavelength band (Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and the deflector 272 deflect all signals within a wavelength band "BLUE") and passing signals deflected by other means for deflecting in the second stack. (Figure 29 of Riley et al, a deflector, e.g., 270, passes a signal, e.g. "BLUE" deflected by another deflector, e.g., deflector 272).

But, Rockewell and Sakanaka and Riley et al does not teach a second stack of means for deflecting respective electromagnetic signals passing through the aperture structure at respective angles, individual means for deflecting in the second stack deflecting substantially all signals each within its respective non-overlapping wavelength band and passing signals deflected by other means for deflecting in the second stack.

Since Rockewell and Sakanaka and Riley et al teach a stack of deflectors, at the time of the invention, it would have been obvious to a person of ordingary skill in the art to incorporate in sytem disclosed by Rockewell and Sakanaka and Riley et al a second stack of deflectors. The suggestion/motivation for doing so would have been to further increase the system capacity by using polarization dependent signals, that is each stack of deflectors deals with different polarization signal. Claim 65 is not patentable different from the Rockewell and Sakanaka and Riley et al, because it is "to duplicate a part for a multiple effect" (see St. Regis Paper Company v. Bemis Company, Inc., 193 USPQ 8

(CA 7 1977) "It is difficult to conceive of a more obvious method of strengthening a certain type of bag than putting one bag inside of another.").

12). With regard to claim 80, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57, 60 and 79 above. And Rockwell and Sakanaka and Riley et al further disclose wherein individual means for deflecting in a stack pass signals deflected by other means for deflecting in a stack (e.g., Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and a deflector, e.g., 270, passes a signal, e.g. "BLUE" deflected by another deflector, e.g., deflector 272).

13). With regard to claims 85, 98, 101 and 114 (in view of 112 rejection above), Rockewell discloses a device and method for communication (Figure 2) comprising:

an aperture structure (the telescope 64 in Figure 2, for passing electromagnetic signals); and

deflector (the mirror 62 in Figure 2) deflecting respective electromagnetic signals (the signals λ_T and λ_R in Figure 2), the electromagnetic signals passing through the aperture structure (Figure 2, the mirror 62 is rotated to fine tune the signal beams, column 7 line 57 to column 8 line 21, the signals λ_T and λ_R is steered to passing through the aperture structure to and from remote devices such as satellite or ground station, Figure 1).

But, Rockewell does not disclose a stack of deflectors, and a deflector in the first stack passing a signal deflected by another deflector in the first stack, and individual deflectors in the first stack deflecting substantially all signals within the individual deflectors' respective non-overlapping wavelength band and passing signals deflected

by other deflectors in the first stack, with at least one defector in the first stack deflecting substantially all signals within a wavelength band; and a second stack of deflectors defecting respective electromagnetic signals of respective wavelengths at respective angles, the electromagnetic signals passing through the aperture structure, individual deflectors in the second stack deflecting substantially all signals within the individual deflectors; respective non-overlapping wavelength band and passing signals deflected by other deflators in the second stack.

However, Sakanaka, in the same field of endeavor, discloses a deflector (the mirror 23 in Figure 1) that can dynamically deflect different signals from different transceivers at different angles (11a, 11b and 11c in Figure 1, column 4, line 31-61). However, Sakanaka teaches one deflector, and the base system 10 in Figure 1 can transmit and receive to and from only one remote device at a time. But, another prior art, Riley et al, discloses a stack of wavelength dependent deflectors (266, 268, 270 and 272 in Figure 29, and 103 in Figure 1B), and the deflectors deflect respective electromagnetic signals of respective wavelengths (e.g., the RED, YELLOW, GREEN and BLUE) at different respective wavelength dependent angles (Figure 29, each deflector has different deflecting angle).

Sakanaka teaches to communicate with different remote devices through deflector, Riley et al teaches a stack of wavelength dependent deflectors, the combination of Sakanaka and Riley et al can make the device of Sakanaka to communicate with multiple device at the same time. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the

deflector and wavelength dependent deflecting as taught by Sakanaka and Riley to the system of Rockewell so that the system can transmit and receive to and from multiple remote devices at a time and the system capacity can be substantially increased.

Although Rockewell and Sakanaka and Riley et al does not teach a second stack of deflectors, since Rockewell and Sakanaka and Riley et al teach a stack of deflectors, at the time of the invention, it would have been obvious to a person of ordingary skill in the art to incorporate in sytem disclosed by Rockewell and Sakanaka and Riley et al a second stack of deflectors. The suggestion/motivation for doing so would have been to further increase the system capacity by using polarization dependent signals, that is each stack of deflectors deals with different polarization signal. Claim 65 is not patentable different from the Rockewell and Sakanaka and Riley et al, because it is "to duplicate a part for a multiple effect" (see St. Regis Paper Company v. Bemis Company, Inc., 193 USPQ 8 (CA 7 1977) "It is difficult to conceive of a more obvious method of strengthening a certain type of bag than putting one bag inside of another.").

14). With regard to claims 99 and 115, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 98 and 114 above. And Rockwell and Sakanaka and Riley et al further disclose wherein individual deflectors in a stack pass signals deflected by other means for deflecting in a stack (e.g., Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and a deflector, e.g., 270, passes a signal, e.g. "BLUE", deflected by another deflector, e.g., deflector 272).

15). With regard to claims 117 and 118, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1 and 29 above. And Rockwell

and Sakanaka and Riley et al further disclose wherein the device or method transmits and/or receives wavelength division multiplexing electromagnetic signals (Figure 2 of Rockwell, e.g., the λ_T is a wavelength division multiplexed optical signal comprising λ_1 and λ_2).

12. Claims 2, 30, 58 and 81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockewell (US 6,327,063) and Sakanaka (US 7,058,307) and Riley et al (US6,763,149) as applied to claims 1, 29 and 57 above, and in further view of Rice (US 5,347,387).

1). With regard to claims 2, 30 and 58, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell further disclose an aperture linear/circular polarization device (the Polarization Changer 56 in Figure 2) after the deflector (mirror 62). But, the linear/circular polarization device in Rockwell's system is not between at least one of the deflectors and the aperture structure.

However, the polarization changer (56 in Figure 2) can be put between the mirror 62 and the telescope 54. Rice et al discloses such a polarization beam rotator (16 in Figure 1) that is between one of the deflectors (converging mirror) and the aperture structure (14 and 15 in Figure 1).

By putting the polarization beam rotator, the signals with different polarizations can be separated by the following polarization beam splitter. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the polarization rotator as taught by Rice to the system of Rockwell and Sakanaka

and Riley et al so that the system can transmit and receive signal with different polarizations and the system capacity can be substantially increased.

2). With regard to claim 81, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57, 60 and 79 above. And Rockwell discloses a polarization beam splitter (54 in Figure 2). But Rockewell and Sakanaka and Riley et al does not disclose the polarization beam splitter coupled to the first stack, second stack, and the aperture means.

However, Rice discloses a polarization beam splitter (17 in Figuer 1) coupled to the reflector (Mirror 20 in Figure 1) and the aperture (14 and 15 in Figure 1). The combination of Rockewell and Sakanaka and Riley et al disclose an aperture and two stacks of deflectors, therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the polarization beam splitter as taught by Rice to the system of Rockewell and Sakanaka and Riley et al so that the beam splitter can couple the first stack, second stack, and the aperture, and then system can transmit and receive to and from multiple remote devices at a time and the system capacity can be substantially increased by using the polarization multiplexed signals.

13. Claims 66, 86, 102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockewell (US 6,327,063) and Sakanaka (US 7,058,307) and Riley et al (US 6,763,149) as applied to claims 57, 60-62 and 65 above, and in further view of Huang et al (US 6,643,064).

Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57, 60-62 and 65 above. But Rockwell and Sakanaka and Riley et al

do not disclose wherein at least one second stack deflectors' wavelength band is located between two first stack deflectors' wavelength bands and at least one first stack deflectors' wavelength band is located between two second stack deflectors' wavelength bands.

However, to interleave two set of signals is well known and a common practice in the art. Huang et al discloses a system and method (Figure 1) to separate two sets of signals with different polarizations (Figure 1, e.g., the signal 1, 3, 5 etc. have one polarization and signals 2,4 and 6 etc have another polarization), and the wavelength band of each signal in set 200 is between two wavelength bands of two signals in the second set of signal 300.

Huang et al discloses a system and method that can decrease the interval between adjacent channels and thus increase the total transmission capacity under the existing network structure using the optical signal interleaver comprised of a polarization beam splitter/combiner, a polarization rotator, a polarization beam displacer, and a beam angle deflector, the incident beam output from an optical fiber collimator (the light signal with all wavelengths) can be separated into an O-ray and an E-ray, which then enter two ports of a double optical fiber collimator; and then the interference between the adjacent channels is decreased; and thus, the system can increase the total transmission capacity under the current network structure.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the wavelength interleaving method as taught by Huang et al to the system of Rockwell and Sakanaka and Riley et al so that one second

stack deflectors' wavelength band is located between two first stack deflectors' wavelength bands and one first stack deflectors' wavelength band is located between two second stack deflectors' wavelength bands and then the system can transmit and receive signal with different polarizations and the system capacity can be substantially increased.

Allowable Subject Matter

14. The indicated allowability of original claims 9, 10, 23-25, 37, 38 and 51-53 are withdrawn in view of the new ground rejections.

15. Claims 68-78 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. Claims 87-97 and 103-113 allowed.

17. Claims 100 and 116 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter: the present invention comprises a free space communication device for increasing traffic throughput and widening the utility of optical terminals. And the wavelength division and polarization division multiple access free space optical terminal is disclosed; using polarization beam splitter, polarization rotators and stacks of

deflectors which are wavelength dependent and movable, the device can transmit and receive electromagnetic signals through a single aperture to and from multiple remote devices at the same time. The closest prior art Rockwell (US 6,327,063) and Sakanaka (US 7,058,307) shows a similar system and a single aperture. However, the prior art fails to disclose the stacks of movable deflectors that can deflect signals at nearly normal incidence, and the prior art also does not teach to communicate with multiple remote devices through a single aperture at the same time.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Orino et al (US 5,627,669) disclose optical transmitter-receiver and a wavelength selective filter is used.

Farr (US 6,940,593) discloses a stack of deflectors.

Bloom et al (US 5,710,652) discloses a laser communication transceiver and system.

Arnold et al (US 6,347,001) disclose a free-space laser communication system having six axes of movement.

Kato et al (US 6,618,177) discloses a light space-transmission device..

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
April 19, 2007

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER